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10/677,354	10/03/2003	Hiroshi Kameda	030673-169	9803

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EXAMINER	
OKEZIE, ESTHER O	

ART UNIT	PAPER NUMBER
3654	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary	**Application No.** 10/677,354	**Applicant(s)** KAMEDA ET AL.	
	Examiner Esther O. Okezie	**Art Unit** 3654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-7 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

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DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ulrich in view of Mullen.

2. Re claim 1, Ulrich discloses a robot end effector comprising: a palm plate (20), at least first and second finger units (30, 40, 45), a turning actuator (80) fixed facing forward at a rear side of the palm plate (fig 3); wherein the first and second finger units each comprise an actuator (175) having a rotational output shaft (shaft above drive motor 175 in figure 4), a finger main body (62,64), and a joint portion (72) that links the rotational output shaft and the finger main body (see figs 3 and 4); the actuator of the first finger unit (30) is fixed facing forward on the palm plate (each of the three fingers 30,40, and 45 have an actuator 175 for opening and closing the finger body, the actuators 175 are all fixed facing forward on the palm plate (column 8, lines 17-19; figs 3 and 5), and the joint portion and the finger main body project forward from a front surface of the palm plate (fig 1); the actuator (175) is driven to allow the finger main body to be bent around the joint portion (72) to a predetermined angle in a direction away from the front surface of the palm plate and in a direction towards the front surface

of the palm plate from a center position that extends along the center axis of the rotational output shaft (column 8, lines 35-53; figs 3 and 4); and the turning actuator (80) is driven to allow the second finger units (40,45) to be turned to a predetermined angle around a center axis of rotation of the turning actuator in a direction away from a position adjacent to the first finger unit ("In a preferred embodiment one finger 30 is stationary and does not rotate about its palm axis 70. However, two fingers rotate in equal and opposite directions; the rotational motion of these fingers is driven by a single actuator 80." Column 11, lines 37-45).

Ulrich does not disclose a separate turning plate fixed perpendicular to the rotational output shaft of the turning actuator upon which the rotating fingers (40,45) could turn, and upon which the actuators of the fingers are located forward on the plate. The fingers rotate facing forward on the palm plate (20) and the actuators (175) are fixed facing forward on the plate as seen in figures 2, 7-7D, and 3. Mullen teaches a mechanical hand including four stationary fingers (12A-12D) and one rotating finger or thumb (13). The fingers lie on a palm plate (11) and all of the fingers have a separate actuator 27 for flexing each finger (column 8, lines 53-68; column 9, lines 1-6). The rotating finger (13) is supported on a mounting plate (53) that lies on the palm plate (11) and the finger rotates upon the mounting plate (53). The actuator 27 of the finger (13) is mounted on this plate (53).

It would have been obvious to one of ordinary skill in the art to modify the robot hand of Ulrich as taught by Mullen to provide plates separate from the main palm plate (20) for rotation of the rotating fingers (40,45) because a separate plate for rotation would provide greater revolution and mobility of the rotating fingers than the main palm plate that obstructs the rotational motion of the fingers.

3. Re claim 2, Ulrich discloses two second finger units (40, 45) and one turning actuator (80) to turn the second finger units, wherein these two fingers are disposed on both sides of the first finger unit (30; see figures 2, 7C, and 7D). Ulrich does not disclose two actuators to turn the fingers, only one. It would have been obvious to one of ordinary skill in the art at the time of the invention to add another actuator in the arrangement, since it has been held that duplication of essential working parts of a device involves only routine skill in the art.

4. Claims 3,5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ulrich and Mullen as applied to claim 1 above, and further in view of Mimura et al.

1. Re claim 3, Mimura et al discloses a finger module of a robot hand comprising: a mounting flange (drive module 3 with outer case 24B), an actuator (drive motor 31) attached to the mounting flange ("The first drive motor 31 is constructed by an electric motor fixed in a rectangular relation to the outside wall of the upper part of the outer case 24B at the outside of the first link module." Column 5, lines 50-56), a rotational output shaft (see figure 3, shaft connected to drive motor 31 within first gear 32) of the actuator that passes through the mounting flange and projects in the forward direction, a drive-side bevel gear (32) coaxially fixed to a tip portion of the rotational output shaft (column 5, lines 56-60: "The second bevel gear 33 is fixed to the right end of the first

joint shaft 1S, to which a rotating torque is transmitted by a first bevel gear 32 of a small diameter formed on the tip of the rotating shaft of the first drive motor 31…"), a pair of bearing housings (portion bearings 2A,2B, 23A,23B) that extends in a forward direction away from a front surface of the mounting flange through positions on both sides of the drive-side bevel gear, bearings (2A,2B, 23A,23B) mounted in the bearing housings, a joint shaft (1S) rotatably supported at both ends by the bearings (see figure 3, bearings 2A,2B), and aligned in a direction perpendicular to a center axis line of the rotational output shaft of the actuator, a driven-side bevel gear (33) coaxially fixed on an external peripheral surface of the joint shaft, and engaged with the drive-side bevel gear, a connecting member (T-shaped spline 34B with spline 34C, connecting the joint shaft 1S with the outer casing 24B of finger module) having one end fixed to the joint shaft (column 5, lines 61-68), and extending in the direction perpendicular to the joint shaft, and a finger main body (outer case 24B of finger module) connected to a tip portion of the connecting member (figure 3). Ulrich discloses a more complex gearing arrangement for the fingers (30,40,45) in figure 4, which includes drive motor (175) and drive gear (105) attached to the shaft and connected to a worm gear mechanism (100) which drives the joint shaft (72) of the finger. It would have been obvious to one of ordinary skill in the art to replace the finger on the palm of the combination of Ulrich and Mullen with the finger as taught by Mimura et al in order to provide a less complex gearing arrangement than the worm gear mechanism of Ulrich.

2. Re claim 5, Mimura et al discloses "a plurality of strain gauges 35 at a portion close to the fixed end of the outside wall of the flexible spline 34B" making it possible to

detect any torque transmitted through the spline (column 6, lines 1-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the finger of on the palm of the combination of Ulrich and Mullen with the finger as taught by Mimura et al. in order to provide a finger able to detect torque transmitted through the finger joint and thereby control backlash created in the gears.

3. Re claim 7, Mimura et al. does not disclose the duplication of the members of claim 3. It would have been obvious to one of ordinary skill in the art to duplicate these essential members along the finger for more versatile pivotal movement, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ulrich and Mullen as applied to claims 1 and 2 above, in view of Mimura et al and further in view of Langer. The bearings (172) of the combination of Ulrich and Mullen and the bearings (2A, 2B) of Mimura do not disclose a spring plate mounted on an external end surface of the bearings. Langer teaches a robot arm and wrist assembly wherein bearings (151,152) rotatably support the joint or pivot shaft (153). A spring plate (160) is provided to bear against the bearing (152) in order to resiliently hold the shaft in place against the bearing “so there is no likelihood of increasing ‘play’ or looseness in the pivots of the arm structure” (fig. 10; column 6, lines 13-22; column 8, lines 41-59). It would have been obvious to one of ordinary skill in the art to replace the finger Ulrich and Mullen as taught by Mimura et al and modified by Langer to include spring or

flexure plates mounted on the bearings supporting both ends of the joint shaft in order to prevent the actuator from carrying external loads through the drive shaft (Langer: "The flexure plate prevents external loads from being carried through the actuator itself. The flexure plates isolate the actuator bearings from such loads and provide a zero backlash drive." column 2, lines 12-20).

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ulrich and Mullen as applied to claims 1 and 2 above, in view of Mimura et al and further in view of Arbrink. The joint shafts of the fingers of Ulrich, Mullen, and Mimura et al. do not disclose a hollow section for wiring. Arbrink discloses a compact gear system intended for rotating the arm of an industrial robot. Arbrink teaches the eccentric shaft (21) is hollow "because it may be advantageous, particular in the case of industrial robot applications, to use the hollow shaft as ducting for electric cables, different media such as air, water and paint..." (column 1, lines 28-32). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the finger Ulrich and Mullen as taught by Mimura et al and modified by Arbrink to include a hollow portion in the joint shaft for electric wiring because it would be advantageous in order to conserve space within a small area as would be needed for robot arms constructed to provide high torque via a compact gear system (Arbrink: column 1, lines 6-32).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 3-7 directed towards a finger on a palm are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 10/677361 directed toward a finger in view of the combination of Ulrich and Mullen teaching the palm and finger features of claims 1 and 2 as discussed below. It would have been obvious to one of ordinary skill in the art to put the fingers of claims 1-5 of U.S. Patent No. 10/677361 on the palm claimed in this application.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Esther O. Okezie whose telephone number is (571) 272-8108. The examiner can normally be reached on Mon-Thurs 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Katherine A. Matecki can be reached on (571) 272-6951. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EOO

Kathy Matecki

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